

**FACTS AND FIGURES  
ON  
TUBERCULOSIS  
AND  
NATIONAL TUBERCULOSIS  
PROGRAMME**



**GOVERNEMENT OF INDIA  
NATIONAL TUBERCULOSIS INSTITUTE  
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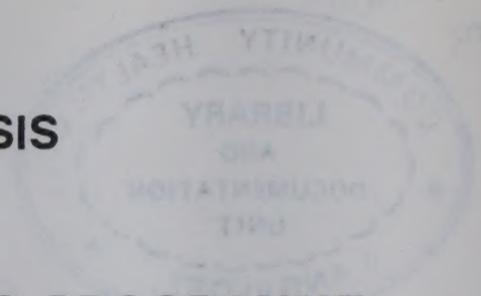
## MEMORABLE DISCOVERIES

1865 - 1868 : Jean - Antoine Villemin, a French veterinary surgeon, showed that tuberculosis is a communicable disease.

inexpensive.

1966 : Rifampicin proved to be an excellent drug against tuberculosis.

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*Compiled by*

V.V. KRISHNA MURTHY

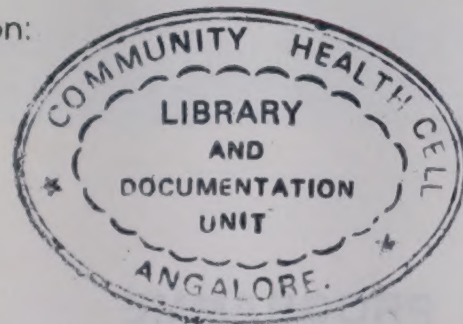
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## FOREWORD

Since inception, the National Tuberculosis Institute had conducted several epidemiological, sociological and operational studies to formulate the National Tuberculosis Programme (NTP). The findings of these studies have been published in various national and international journals. The performance and progress of the programme are reported at several levels. Presumably these journals and reports are not easily accessible to all tuberculosis workers and others interested in tuberculosis work. This booklet is intended to disseminate some important facts and figures on tuberculosis and NTP in a layman's language for easy comprehension by all.

In the first part of the booklet, population statistics, sickness in general and problem of tuberculosis etc are discussed. Origin, philosophy, organisation, performance and progress of the programme are dealt with in the second part..

For the benefit those desirous of acquainting themselves with more details, a short bibliography is furnished at the end.

I hope this booklet will be found useful by all those who are keen to fight the problem of tuberculosis.

Bangalore

Date : 14. 03. 1991

Dr. K. Chaudhuri

Director

## FOREWORD TO THE SECOND EDITION

This booklet was first published during March 1991, with the intention of disseminating the various research findings on tuberculosis and the data on the performance & progress of the National Tuberculosis Programme ( NTP ). The effort was appreciated by many and there has been a steadily growing demand for it. Encouraged, we are happy to publish the second edition.

In this edition, the modified drug regimen for NTP following the recommendations in the workshop on National Tuberculosis Programme held at Surajkund during September 1991 has been incorporated. The contents have also been rearranged suitably under appropriate headings. An appendix giving some epidemiological indices has also been furnished. Printing of the second edition was possible with the generous assistance of the World Health Organisation.

Bangalore

Date : January 1994

Dr.B.T.Uke

Director

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**PART I**

**PULMONARY TUBERCULOSIS & ITS DIAGNOSIS**



## PULMONARY TUBERCULOSIS

- More than 100 years ago (1882) Robert Koch, a German scientist, discovered the rod shaped bacteria causing tuberculosis.
- Tuberculosis can affect any part of the body. Patients of pulmonary tuberculosis infect others through cough.
- **Identification of infection** : a significant reaction to tuberculin test indicates tuberculosis infection ( generally a swelling of about 10 mm to 1TU RT23 at the site of testing).
- **Symptoms** : cough, chest pain, fever and blood in the sputum are the main symptoms of tuberculosis.

- **Diagnosis** : can be diagnosed by : (1) sputum examination for AFB and (2) X-ray examination
- Cases positive on sputum examination ( bacteriological ) are more infectious than that of X-ray cases. Infectiousness of a case is reduced in about 15 days of starting treatment.
- It is estimated that an untreated case would live for two years and infect about 12 persons in a year (estimated to be about seven persons in Indian conditions).
- Tuberculosis is completely curable on adequate regular treatment.
- Tuberculosis can be safely treated at home.

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## **MERITS & DEMERITS OF DIAGNOSTIC TOOLS**

( For pulmonary tuberculosis )

### **Sputum examination**

#### **Direct smear microscopy**

- Simple, inexpensive, reliable and results available immediately.
- Picks up 80% of culture positives under programme conditions.
- Easy to train any non-specialised worker in sputum smear microscopy.

#### **Culture**

- Sure proof of tuberculosis.
- Results would be available after four to six weeks; hence delay in treatment.
- Requires sophisticated laboratory and costly.

## **X-ray examination**

- It could be used for identifying persons requiring sputum examination in a community (survey) or in a Tuberculosis Clinic.
- Persons suspected to be having active tuberculosis of lungs but sputum negative, needing treatment could be detected.
- Some persons not suffering from active tuberculosis may be wrongly diagnosed as cases.
- Out of 100 cases diagnosed on the basis of X-ray about 75 are not likely to be infectious cases in survey situations and about 50 in clinical situations.
- Out of 100 infectious tuberculosis cases, about 20 are likely to be missed by X-ray examination.

- Even doctors with lot of experience in interpreting X-ray pictures differ among themselves in diagnosing tuberculosis. The same X-ray picture could be interpreted differently by the doctor when he sees it again.
- Relatively costly.

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## **PART II**

# **TUBERCULOSIS IN THE COMMUNITY**



## DEMOGRAPHY

- In our country, there are about six lakh (0.6 million) villages and 30,000 towns and cities spread out in an area of 33 lakh square kilometers.
- 844 million people (provisional figure - 1991 census) live in this country - 75 % in rural areas.
- Males are slightly more than females in number - 1000 males to 933 females.
- According to age, about
  - 13 % are under 5 years,
  - 27 % between 5 to 14 years,
  - 31 % between 15 to 34 years,
  - 18 % between 35 to 54 years and
  - 11 % above 54 years.
- Birth rate is 32.0 and death rate 10.8 per thousand per annum.

## **SICKNESS IN THE COMMUNITY**

- On any day, about one out of every 6-10 persons would be sick (10 -15%).
- Sickness is more among females.
- Sickness is more among children below five years and persons aged 45 years or more.
- Majority of the sick people would be suffering from chest symptoms like cough, chest pain or fever.
- Half of the sick people take action for the relief of their sickness..
- Among those who take action for the relief of their sufferings, 45% approach government hospitals, 25% consult private medical practitioners and 30% contact practitioners of indigenous medicine or perform pooja, etc.

## **PULMONARY TUBERCULOSIS IN THE COMMUNITY**

The problem of tuberculosis in the community is measured in terms of proportion of population affected as below :

- Infected with tubercle bacilli ( prevalence of infection ).
- Suffering from tuberculosis disease ( prevalence of disease ).
- Uninfected population becoming infected between two points of time ( incidence of infection ).
- Healthy population developing tuberculosis disease between two points of time ( incidence of disease ).

Prevalence is expressed as a rate at a point of time and incidence as an annual rate.

## Infection

- At any point of time one out of three persons (30 - 40 %) is infected with tubercle bacilli.
- One out of three males (35%) and one out of four females (25%) is infected.
- The rate of infection increases with age - among children aged below five years, 2% are infected as compared to 55% in persons aged 35 years or more.
- During a year, 16 out of 1000 uninfected persons become infected (1.6% per year).
- The rate of incidence of infection increases from a little less than 1% per year in children below five years to 3% among persons aged 35 years or more.

## **Tuberculosis disease**

- At any point of time, four out of 1000 persons of age five years or more are estimated to be having infectious disease. In addition, 16 out of 1000 persons have X-ray active sputum negative disease.
- About six out of every 1000 males and about three among 1000 females would be infectious cases.
- Percentage of cases increases with the age. Of total cases, 93% are in persons aged 20 years and more.
- During a year about 130 out of one lakh persons of age five years or more develop infectious tuberculosis.
- Death due to tuberculosis is 84 per lakh population per annum (mortality due to tuberculosis).

- Of the total deaths ,approximately 10 % are estimated to be due to tuberculosis ( in persons aged over 10 years ).
- Deaths attributable to tuberculosis among cases is estimated to be 13% ( case fatality).
- There are about 28 lakh infectious cases and four times this number (about 112 lakhs) may be sputum negative but have radiologically active disease.
- Probably about one third the above number are being added every year. The same proportion is reduced every year due to death & cure.

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## TREND OF PULMONARY TUBERCULOSIS IN INDIA

- Indirect evidences suggest a downward trend in tuberculosis in areas where studies have been conducted :
- Infection rate among children (0-4 years) is declining from 2.1% in 1961 to 1.2% in 1985 (NTI study).
- Annual rate of decline in the risk of infection is calculated to be around 1.6 to 3.5%.
- The disease is getting concentrated in the adult population; the relative proportion of cases among 5-39 years and 40 years & above was 1:1 in 1961 compared to 1:4 in 1985 (NTI study).
- Smaller proportion of smear positive cases detected in the community being 68 per 100,000 in 1985 compared to 189 in 1961 (NTI study).

- Decline in the mortality due to tuberculosis; from 250 per 100,000 in 1949 to about 80 in 1967.
- Clinicians have observed that the serious forms of tuberculosis like miliary diseases, tuberculosis meningitis etc., have been declining in the recent times (TAI 1968).

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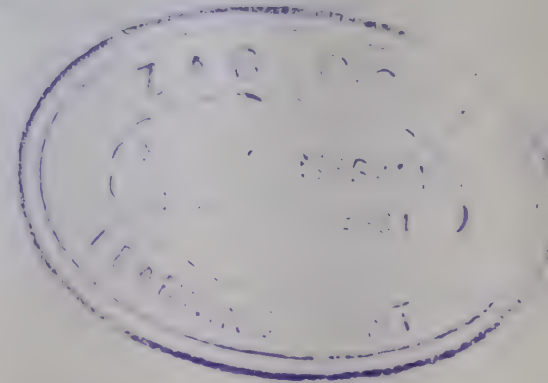
**PART III**

**NATIONAL TUBERCULOSIS PROGRAMME**



## BIRTH OF NATIONAL TUBERCULOSIS PROGRAMME

- Prior to National Sample Survey ( 1955-58 ) the belief was that tuberculosis was a problem of cities and slums.
- For diagnosis and treatment of tuberculosis, Tuberculosis Sanatoria, Tuberculosis Clinics and Hospitals were in vogue.
- The above survey revealed that the prevalence rate of tuberculosis was the same in rural and urban areas.
- With the knowledge that the problem of tuberculosis was predominantly a rural one, the inappropriateness and the inadequacy of the traditional control measures (Sanatoria, etc.) became evident.



- It was also understood that the fresh approach to organise a rural tuberculosis control service must :
  - cover the entire community ;
  - make use of known tools of diagnosis , treatment and prevention ;
  - be well within the available resources in men, money and materials ;
  - promise sizeable benefit to the community in the foreseeable future.
- separate programme for rural areas would neither be practicable nor acceptable.
- To formulate a comprehensive National Tuberculosis Programme ( NTP ), National Tuberculosis Institute ( NTI ) was established in 1960.

## NATIONAL TUBERCULOSIS INSTITUTE

Inaugurated by Pandit Jawaharlal Nehru on 16th September 1960.

### **Objectives are to:**

- formulate and evolve a practicable, economically feasible and widely acceptable tuberculosis programme for the entire country ;
- train medical and para medical workers to efficiently implement the programme in rural and urban areas;
- undertake necessary research and to give substance & support to the above two aims ;
- monitor the NTP (introduced in 1978).

## ACHIEVEMENTS

### Programme

- Formulated the NTP (1962) and is continuously evolving the same after the implementation by various states.
- Prepared Manuals giving exhaustive guidance in the working procedures for all categories of programme personnel.
- Workshops, Seminars and refresher courses : conducted about 40 sessions for Professors, State & District Level Health Administrators.
- **Group Educational Activities** : are being carried out in the Institute and in various states in a phased manner under the auspices of WHO.
- **Training** : conducted 68 courses (including five International Courses) of 10-12 weeks duration.
- So far trained about 5556 DTP personnel ( DTO- 1288; TO -1260; LT-964; XT-819; SA-825; BCG Team Leader - 400 ).

- **Research** : so far, 196 research studies were approved by the Technical Forum of the Institute.

## **Publications**

- Three hundred and fifty five scientific papers in international and national journals, besides 16 technical publications.
- A book entitled " An introduction to tuberculin testing and BCG vaccination ".
- Two booklets entitled: (1) " The tuberculin skin test " - a supplement to NTI News letter and (2) "For general practitioner on tuberculosis ".
- Brochures for the benefit of District Tuberculosis officers (DTO), Medical Officers of PHIs and general public.
- NTI Bulletin : a periodical publication.

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## **NATIONAL TUBERCULOSIS PROGRAMME**

### **Objectives :**

- The long term objective of NTP is to reduce tuberculosis in the community sufficiently quickly to the level that it ceases to be a public health problem.

### **The operational objectives are :**

- To detect maximum number of tuberculosis patients amongst out-patients of Health Institutions giving priority to sputum positive tuberculosis patients.
- To undertake the above activities as an integral part of the general health services.

## **Basis of NTP :**

NTI conducted a series of epidemiological, sociological and operational studies.

Based on the following, the programme was formulated:

- The problem of tuberculosis is predominantly a rural one in India.
- About half of tuberculosis patients contact Health Institutions for relief of their suffering.
- Large number of Health Institutions are available for diagnosis / treatment.
- Domiciliary treatment is as effective as institutional treatment and in fact, is more acceptable to patients, as their domestic life is not disrupted.

## **DISTRICT TUBERCULOSIS PROGRAMME**

District Tuberculosis Programme (DTP) is the basic organisational unit of the NTP.

All Health Institutions (PHI) in the district, under the guidance and supervision of District Tuberculosis Officer (DTO), are functional units of the DTP.

### **Activities**

Case - finding, Treatment, managerial, supervision, recording and reporting (monthly, quarterly and annually).

#### **- Programme organisation:**

##### **I. District Tuberculosis Centre :**

- **Personnel :** DTO, Treatment Organiser, Laboratory Technician, X-ray Technician, Statistical Assistant - all trained at NTI.

## - **Functions**

Implementation of DTP in the district;

Training of PHI personnel and supervision;

Diagnosis - by X-ray and sputum examination;

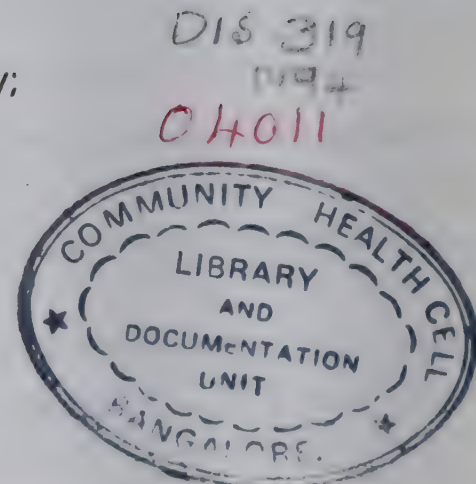
Treatment - standard and short course chemotherapy;

Maintenance of District tuberculosis Case Index;

Reporting - monthly, quarterly and annually.

## **II. PHIs : classified into three types:**

- **X-ray Centre (XC)** - offering X-ray and direct smear microscopy examination and treatment.



- **Microscopy centre (MC)** - offering direct smear microscopy ( DS ) examination and treatment.
- **Referring centre (RC)** - preparing sputum smears for DS at the nearest XC / MC and treatment.
- **Functions of PHI** : diagnosis/referral, treatment, defaulter action, reporting (monthly to DTC ).
- **Case - finding** : out-patients reporting - (a) Cough or fever or chest pain for more than two weeks, and (b) history of haemoptysis, are examined by X-ray / DS. Those found positive ( bacillary/radiological ) are given anti -tuberculosis treatment .
- **Treatment** : two options are available - Standard regimen of 12 months and Short Course Chemotherapy ( SCC ) regimen of six or eight months.

- **Standard / Conventional Regimens :**
- Two options are available - Duration : 12 months .

**R<sub>1</sub>: 2STH/10TH - for**

1. New smear positive cases where SCC is not available or unable to continue SCC.
2. Smear negative patients with extensive radiological evidence of disease.
3. Extra-pulmonary cases in general.

**First Two Months :** S-0.75 g - daily at PHI and H-300 mg + T-150 mg in single dose - at home - to collect monthly.

**Next ten months :** TH - daily at home - to collect monthly - dosage: same as above.

**R<sub>2</sub>: 12TH - for**

- 1) Smear negative patients with radiological evidence of activity other than those on R<sub>1</sub>.

2) Lost patients, smear negative on reporting back.

3) Highly irregular patients.

**For twelve months** : H - 300 mg + T 150 mg - both drugs in single dose- daily - orally at home - to collect monthly.

Whenever T is not tolerated, replace by E .

- **Short Course Chemotherapy Regimens:**

- Two regimens are available - Duration : 6 or 8 months..

**R<sub>A</sub>: 2 EHRZ / 6TH - for**

1. All smear positive cases newly indexed under DTP.

2. Serious forms of extra - pulmonary tuberculosis (e.g. meningeal and spinal tuberculosis).

**First two months** : E-800 mg , H-300 mg, R-450mg and Z - 1.5 g - in single dose - daily at home - to collect once in 15 days.

**Next six months** : H 300 mg, T-150 mg or E-800 mg ( whenever T is not tolerated) - in single dose - daily at home - to collect monthly.

**R<sub>B</sub>**: 2 SHRZ/4S<sub>2</sub>H<sub>2</sub>R<sub>2</sub> - for

1. Patients remaining smear positive on completion of treatment with R<sub>1</sub>, R<sub>2</sub> & R<sub>A</sub> or on return after lost.
2. Cured patients returning with smear positive results.

**First two months** : S - 0.75 g, H - 300 mg, R - 450 mg, Z - 1.5 g - all drugs administered daily under supervision at DTC / PHI .

**Next four months :** S - 0.75 g, H - 600 mg, R - 600 mg twice weekly - all drugs administered under supervision at DTC / PHI.

S - Streptomycin

H - Isoniazid

R - Rifampicin

E - Ethambutol

Z - Pyrazinamide

T - Thioacetazone

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## DECADAL IMPROVEMENT IN THE PERFORMANCE OF DTP

Sl. No.	Activity	10 years back	Present	Improve-ment (%)
1.	No. of DTPS in the country	353	390	10
2.	Sputum examined for new out - patients per DTP	4,530	11, 900	163
3.	New Sputum examinations done in PHIs Per DTP	1,700	8,560	403
4.	No. of sputum positive cases diagnosed per DTP	546	826	51
5.	New sputum positive cases diagnosed in PHIS per DTP	186	430	128

Sl. No.	Activity	10 years back	Present	Improve-ment (%)
6.	Percentage of sputum positive cases diagnosed by PHIs out of the total cases diagnosed in DTP	34	52	53
7.	Patients making 12+ collections (Percentage)	25	40	60

Items 2 - 6 : give annual output

## CASE - FINDING ACTIVITY OF NTP DURING VI & VII PLAN

Activity / Institution		During Plan		Increase (%)
		VI	VII	
* X - ray examinations	DTP	105	135	29
* Sputum examinations	DTP	110	208	89
	DTC	50	60	20
	PHI	60	148	147
* Sputum Positive cases	DTP	11.0	14.5	32
	DTC	6.5	7.2	11
	PHI	4.5	7.3	62
* Sputum nagative cases		32.0	48.0	50
Contribution of PHIs (%):				
Sputum examination		54	71	31
Sputum cases		41	50	22

( \* figures in lakhs )







**PART IV**

**MISCELLANEOUS**



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# APPENDIX

## EPIDEMIOLOGICAL INDICES

Indices	Age Group (years)					All Ages
	0 - 4	5 - 14	15 - 34	35 - 54	55 +	
Percentage to the total population	13	27	31	18	11	100
Infected (%)	2	12	40	54	57	30
Bacillary cases per thousand population	-	1	4	6	11	4
Annual incidence of infection per 1,000	8	12	22	32	34	16
Annual incidence of bacillary cases per 100,000	-	57	134	133	420	132
Mortality due to tuberculosis Annual per 100,000	-	5	55	128	433	84

## ACKNOWLEDGEMENT

The data has been drawn from various sources. The sense of indebtedness is expressed to all the scientific workers responsible for generating the ideas /data used in this text. The encouragement and guidance received from Dr.K.Chaudhuri, erstwhile Director and Dr.A.K.Chakraborty, Additional Director, NTI, is gratefully acknowledged. Mrs. Sudha Murthy's efforts in the publication of the booklet is appreciated. Finally thanks are due to the WHO for getting the booklet printed.

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"CONCERN FOR MAN AND HIS FATE MUST ALWAYS FORM THE CHIEF INTEREST OF ALL  
TECHNICAL ENDEAVOURS. NEVER FORGET THIS IN THE MIDST OF YOUR DIAGRAMS AND  
EQUATIONS."

EINSTEIN

"THE FRUITS OF HEALTH RESEARCH LIKE ALL OTHER RESEARCH ARE RARELY THE WORK OF ONE  
PERSON ALONE. EACH RELIES ON THE WORK OF PREDECESSORS AND CONTRIBUTES TO THE  
WORK OF SUCCESSORS"

Dr.H.MAHLER  
Former D.G., WHO